APPENDIX - IV

MAHARSHI DAYANAND SARASWATI UNIVERSITY, AJMER

Format for Outline of Proposed Research work
(to be supplied in Six copies)

1. Nameof Scholar (In English) ..... RICHA RAWAT .....
   (In Hindi) ..... ऋचा रावत .....
2. Title of the Research Work :
   (In English) Impact of Quartz and feldspar Pulverizing Industry of Rajasthan : With special reference to Ajmer District
   (In Hindi) राजस्थान के क्वार्ट्ज एवं फैल्सपार चूर्णीकरण उद्योग का प्रभाव : अजमेर जिले के विशेष संदर्भ में
3. Location
   a. Institution/Department where the work is to be done Dept. of Geography, Govt. College Ajmer
   b. Geographical area of Investigation, if any. Rajasthan State (Ajmer District
4. Introduction Importance of Proposed Investigation, Objectives.
5. Review (Work already done on the subject of proposed Research Study.)
6. Research Gaps identified in the proposed field of investigation. (Based on the review)
7. Major Hypothesis, if any.
8. Research Methodology.
9. List of References cited.

Richa Rawat
11/3/13

Signature of the Candidate with date

Outline Approved.

Name and Signature of supervisor with date & seal.

Madhu Singh 11/3/13
Lecturer in Geography
Govt. College, Ajmer

APPENDIX - VI

MAHARSHI DAYANAND SARASWATI UNIVERSITY, AJMER

Certificate By Supervisor

Certified that :

1. I am willing to guide the research work of ~~Shri/~~Km./~~Smt.~~ .....RICHA RAWAT..... on the above subject if he/she is registered for Ph.D.
2. To the best of my knowledge, the subject selected has not been studied and is not being studied so far in any University.
3. The subject is of sufficient scope to keep the candidate engaged for two years.
4. The subject will lead to a valuable contribution. I have seen and approved the outline of proposed research work submitted by the candidate.
5. I have ....two..... (give numbers) Research candidates registered under my supervision and the serial number of this candidate whose application is being forwarded for registration is .....TU/M..... (give the serial number)
6. The candidate is not in a close relation (the term of close relation is defined in the examination ordinance of the University)

Madhu Singh 11/3/13

Lecturer in Geography
Govt. College, Ajmer

Signature of the Supervisor with date

Certified that the available facilities will be extended to ~~Shri/~~Km./~~Smt.~~ .....RICHA RAWAT for research work if he/she is registered for Ph.D.

11/3/13

Signature of the Principal/ Director of the Institution with date

11/3/13

Head
Department of Geography
Govt. College, Ajmer

Signature of the Head, Department with date

Impact of Quartz and Feldspar Pulverizing Industry of Rajasthan: With special reference to Ajmer District

A synopsis

Submitted for the registration of Ph.D. in the faculty of Arts

By

Richa Rawat
(Research scholar)

Under supervision of

Dr. (Mrs.) Madhu Singh
Lecturer in Geography
Government College Ajmer

Maharshi Dayanand Saraswati University
Ajmer (Rajasthan)

Introduction

Rajasthan has a glorious heritage in the field of mines and minerals. The State is geologically so endowed that it has become a veritable repository of minerals. Rajasthan is blessed with 79 verities of minerals, of which 58 are being commercially exploited. Important minerals with which the name of this State is intimately associated are that of non- ferrous metals (lead, zinc and copper) and ferrous minerals such as tungsten and a number of industrial minerals. Presently, the State is the sole producer of jasper and wollastonite and a leading producer of cement and steel grade lime stone, marble, soapstone, ball clay, calcite, feldspar, natural gypsum, kaolin, rock phosphate, ochre and building stones besides, tungsten, lead-zinc concentrates, and copper metal. Huge reserves of lignite, crude oil, bitumen, high quality gas adds to its mineral strength.

Mining is not only a major source of employment in rural and tribal areas of the state but also a major source of revenue and plays an important role in the development of the state. Apart from these minerals Rajasthan is rich in the quartz and feldspar minerals. In 2010-11 Rajasthan produced 114,703 tonnes of quartz (25% of national production) and 239,924 tones of feldspar (50% of national production).

Importance of proposed investigation

Quartz and feldspar (ceramic minerals) deposits are found in more than 200 kms long belt extending from Rajsamand in south west to Tonk in north east moving through Bhilwara and Ajmer. These minerals are also found extensively in the district of Jaipur, Sikar, Jhunjhunu, Udaipur, Pali and Sirohi. Rajasthan is the main producer of quartz and feldspar along with other ceramic minerals like clay and wollastonite. There

is a huge potential for setting up of ceramic units, specially the vitrified ceramic tiles, which are in increasing demand presently.

The proposed study is planned to identify the mining areas, and to analyze the localization of quartz and feldspar pulverizing industry in Ajmer district. Various processing techniques, products and their industrial use will also be identified. Future scopes for development of industries will be assessed.

Meaning of Quartz and Feldspar

The term 'Quartz' is often referred to as a synonym for silica (Sio_2) which is one of the most ubiquitous materials in the earth's crust, quartz, quartz crystals, quartzite, silica sand and molding sand are all coined together in one generic name '*Silica Minerals*'.

Feldspar is derived from the German words *Feld*, "field", and *Spath*, "a rock that does not contain ore". This group of minerals consists of framework tectosilicates. Composition of major elements in common feldspars can be expressed in terms of three end members:

1. Potassium feldspar (K spar) end member : $KAlSi_3O_8$
2. Albite end member : $NaAlSI_3O_8$
3. Anorthite end member : $CaAl_2Si_2O_8$

Feldspar is by far the most abundant group of minerals in the earth's crust, forming about 60% of terrestrial rocks. Feldspars are primarily used in industrial applications for their alumina and alkali content. Quartz and feldspar granule and powder are used in various industries like glass, foundry, ceramic, cosmetic, electrical abrasive and paints etc.

Study area

Ajmer District: Location & Geography

Ajmer District is situated in the centre of Rajasthan state lying between 25.38" and 26.58" north latitudes and 73.54" and 75.22" east longitudes. The district is surrounded by Jaipur and Tonk district in east and Pali district in west, Nagaur district touches its north boundaries while Bhilwara district in the south, the total geographical Area of Ajmer district being 8.50 lac hectares.

Sub divisons

The district has no natural division. Its boundaries are territorial and comprised of four sub-divisions namely Ajmer, Beawar, Kekri, and Kishangarh. Ajmer sub-division forms the Northern part of district and is more or less triangular in shape, whereas Beawar subdivision is an irregular terrain lies in the sourth-west of district. The track is generally hilly. Kekri sub-division forms the south eastern portion of the district and consists of two separate strips of land from each other. The distinguishing feature of the district is the Aravalli range, which has more prominence near the town of Ajmer.

Availability of Mineral deposits in Ajmer District

The geology of district is that of the Aravalli range which extends throughout the district except the north-western part which is flat and plain and covered by sand dunes. Almost whole of the area shows very steep vertical digs and the rock are repeated several times in the section. It is the quartzite section which forms highest peaks above the general level of range at Taragarh near Ajmer. The best rocks in the region are granites, feldspathic chistes, calgeneisses marble and quartzite exposed along the Ajmer-Nasirabad pass. Gneiss and granite are predominating in Beawar section.

Limestone, mica chistes and feldspathic quartzite, coarse grained marble, lime and building stone are seen in the south west plains of Ajmer.

Feldspar deposits are scattered in large area of Ajmer district. The principal occurrences are in Ajmer, Beawar, Nasirabad, Kekri and Kishangarh tehsils, namely at Lohagal, Bandar-Sindiri, Foy Sagar, Piproli, Rajgarh, Kalesara, Makrera, Beawar, Loharwara, Dhal, Bhodli, Sanod, Basunbani, Kharwa, Lothiana, Surajpura, Soniana, Kishanpura, Jawaja, and Kalathera.

The feldspar deposits of Ajmer district are largely potash bearing. The quality of feldspar produced in Ajmer- Beawar area is good with Potassium content 11% to 14% which meet the world market standards. The promising areas of Jawaja group, Makrera-Rajgarh group and Tilora-Piproli group of mines are the most important feldspar producing areas where good quality feldspar is being mined.

Other minerals found in the district are mica, asbestos, vermiculite, soap stone, masonry stone and brick clay. Granite deposits are found at Sendra, Beawar, Bandanwara and Kishangarh.

Production of quartz and feldspar in Ajmer district in the Year 2010-11 was 18230 tonnes (16 % of Rajasthan) and 65,821 tonnes (28% of Rajasthan) respectively. There are 2,743 minerals base working units employing more than 18,000 people in Ajmer district.

Quartz is mainly used in the manufacturing of different types of glasses and ceramic industry. Crushed quartz is used in both foundry cores and moulds because of its resistance to thermal shock. Quartz and quartzite are used in the manufacture of refractory silica bricks which are used in coke ovens, ceramic kilns, glass tank crowns

and as blast furnace chequers in steel mills. Quartz is also used as flux in smelting base metal ores where iron and basic oxides are slagged as silicates.

Feldspar is used as a source for alumina and alkali in ceramic and glass industries which account for more than 90% consumption. It also finds use as functional filler in paint, plastic, rubber and adhesive; as a bonding agent in abrasives; and in the manufacture of artificial teeth, fertilizer and white cement.

Objectives of the Study

The work aims to attain the following objectives:-

1. Locational analysis of quartz and feldspar pulverizing mills in Ajmer district.
2. To identify major industrial use of quartz and feldspar powder of Ajmer district.
3. To assess diverse socioeconomic and environmental impact of quartz and feldspar pulverizing industry.
4. To identify major health issues in workers of quartz and feldspar pulverizing industry.
5. To identify major constraints and possibilities in further strengthening of quartz and feldspar pulverizing industry.
6. To review the plans and policies of State Government in the development of quartz and feldspar mining and mills.

Review of Literature

To understand and outline the distribution, key features, processing and marketing concepts of quartz and feldspar pulverizing industry a number of literatures have been surveyed.

Rathore, Singh, and Saxena (1972) studied feldspar occurrences in pegmatite of Ajmer district. Lal, and Khichi in 1975-76 published detailed assessment of feldspar in lease hold areas of Ajmer district.

Trivedi, Sharma, Meena and Kumar in 1996-97 studied minerals distribution survey for limestone, lime kankar, quartz, feldspar and other economic minerals near villages Jhak, Nasal, Kotri, Thar Ki Dhani, Ragunathpura etc. in Kishangarh tehsil of Ajmer district.

The aerial photo-interpretation carried out by Dr. A. K. Grover in parts of Ajmer and Pali districts showed abundance of pegmatite in the area. These are medium to coarse-grained with pink feldspar, white and colorless quartz, tourmaline, little muscovite, apatite and rarely beryl. Quartz and feldspar pulverizing units in Ajmer district are mainly located at Piplaj, Kharwa, Beawer, Bewanja, Kekri, Sarwar, Parbatpura, Makhupura, Silora etc.

Monov, Sokolov and Stoenchev in 2012 published in detail about grinding process in Ball Mills. Various types of ball mills are being used for pulverization of different minerals.

Reports of Ministry of Micro Small and Medium Enterprises, Government of Rajasthan stated distribution of pulverizing units in Piplaj, Beawar, Nasirabad, Kishangarh and Makhupura in Ajmer District.

According to a report of Mineral policy by Government of Rajasthan, Rajasthan has large deposits of minerals used as raw material in ceramic and glass industries like clays, feldspar, silica-sand and quartz. However, the development of ceramic and glass industries has been quite insignificant with 40% to 70% of the raw material going outside the State.

Feldspar and quartz are critical minerals used as raw materials in the manufacturing of ceramic tiles and sanitary ware. According to a report published in The Hindu on 19th April 2012, the ceramic tiles and sanitary ware industry has asked the Government of India to ban export of feldspar and quartz. Due to globalization and new ventures, the demand for these two minerals has increased. The Board of Indian Council of Ceramic Tiles and Sanitary ware has stated that, a surge in exports of these items is leading to a shortage locally. Undersupply of quartz has caused a steady rise in its prices and is leading to uncertainties in long-term strategies of the domestic sector. The industry body has decided to intensify its dialogue with the concerned Government bodies on the issue of export ban.

Research gap

Though the mining and pulverizing industry of quartz and feldspar in Ajmer district is more than 50-60 years old and there are about 500-600 functioning units, the industry is neglected by researchers. There were no major studies conducted to identify the problems faced by the industry. Rajasthan was once the sole producer of quartz and feldspar in India, but over the years its contribution their production has gradually declined.

Ministry of Micro Small and Medium Enterprises (MSME), Government of Rajasthan is promoting identification of clusters of Micro and Small Enterprises for various sectors throughout the state. Quartz and feldspar pulverizing industry in Ajmer has been identified as one of the potential enterprise by Ministry of MSME, Government of Rajasthan but much has not been done for further strengthening of the industry.

No systematic study has yet been conducted for locational analysis and cluster identification of quartz and feldspar in Ajmer. Considering the above gap the present study is an attempt in the direction to identify the potential of quartz and feldspar industry in economic development and generation of employment in Ajmer district.

Hypothesis

The hypothesis is a powerful tool in research process to achieve dependable knowledge. It helps the researcher to relate theory to observation and observation to theory. A hypothesis (from Greek word– *hypotithenai* meaning "to put under" or "to suppose,") is a proposed explanation for a phenomenon.

Once the selection and definition of the problem have been accomplished, the derivation of the hypothesis is the most important step in the research process. A working hypothesis is a provisionally accepted hypothesis proposed for further research. It is the presumptive statement of a proposition or a reasonable guess, based upon the available evidence, which the researcher seeks to prove through his study.

We will try to test the following hypothesis in our study

'There is existence of micro-clusters in pulverizing industry of Quartz and Feldspar in Ajmer district due to availability of raw material and good infrastructural facilities.'

The short term and long term impact of these micro-clusters of Quartz and Feldspar vis a vis the socio-industrial growth and economic development of the given region will be studied. The proposed study will, at the same time, focus on the environmental issues as influenced by the existence of Quartz and Feldspar pulverizing industry.

Research Methodology

The study will be based on field survey using primary and secondary data.

Primary Data

Primary data will be collected by adopting purposive sampling. The questionnaire for the managers and owners will include question regarding the cost of the establishment of plant; number of employees; raw material supply & source; major buyers of final product; cost of production & maintenance (cost of raw material, labour cost, power consumption, transportation cost etc.); treatment of waste products; health and safety of employees at the site and various problems faced by them in running industries and their possible solutions. They will be enquired about the possible health hazards of the industry and the measures taken to prevent them.

Information will also be gathered from labourers about rough estimate of production, source of raw material, working atmosphere (working hours, safety and any health problem) and their socio-economic status. The labourers will also be asked about the possible health hazards of the industry and their preventive measures. The brief medical history of the workers for any health issues, specific symptoms and treatment taken will be asked.

Secondary Data

Secondary data regarding the mining and pulverizing mills of quartz and feldspar in Ajmer district and Rajasthan state would be collected through various reports of Indian Bureau of Mines (Ministry of Mines); MSME-Development Institute (Ministry of MSME) Government of India; and maps prepared by National Thematic Mapping Organization (NATMO) and survey of India.

Data regarding the production of quartz and feldspar minerals and powder, number of mines and mills, number of labourers engaged in the industry, transportation and marketing of raw material and semi-finished material will be collected from various published and unpublished Government and non Government reports. Extensive search about the industry will be done on Internet. Some specific sources are industrial department of Rajasthan Government Mines Bureau of India.

Data analysis

The data will be categorically compiled in Microsoft office Excel sheets. Statistical calculation will be done using SPSS software. Concentration of quartz and feldspar pulverizing industry will be analyzed by using locational quotient. Interpretations will be drawn in form of tables, diagrams, maps and graphs. Localization of mines and distribution of mills will be shown on maps. Photographs of mines and pulverizing units will be taken to provide the industry its visual effect.

Chapter wise details of proposed research

Introduction

Mineral deposits in Rajasthan

Feldspar in Ajmer and Rajasthan in comparison of India

Quartz in Ajmer and Rajasthan in comparison of India

Objectives and importance of the study

Hypothesis

Methodology

1. Geographical location of the Study area

   1.1.Physiography and geology

   1.2.Climatic condition

   1.3.Vegetation

   1.4.Mineral wealth

   1.5.Human resource

2. Feldspar and quartz mining in Ajmer District

   2.1.Reserve and production of feldspar

   2.2.Uses of feldspar

   2.3.Reserve and production of quartz

   2.4.Uses of quartz

3. Processing of quartz and feldspar

   3.1.Grinding mills: Introduction

   3.2.Principles of pulverization

      3.2.1. Physics of pulverizing

      3.2.2. Functioning of pulverizing mills

   3.3.Types of pulverizing mills

3.3.1. 30/80 mills

3.3.2. Ball mills

4. Locational analysis of quartz and feldspar industry in Ajmer

4.1.Locational distribution

4.2.Labour

4.3.Transportation cost

4.4.Market

4.5.Cost structure

5. Product and production

5.1.Types of grinding products

5.1.1. Fine powder

5.1.2. Granules

5.2.Waste products

6. Health and environmental effects

6.1.Health of employees

6.2.Effect on environment

7. Problems, suggestions and future prospects

8. Conclusion

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